

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY  
NANDED**

**SYLLABUS**

**OF**

**Dairy Science**

**B.Sc. Third Year**

**Choice Based Credit System (CBCS) Semester Pattern**

**Effective from June - 2018**

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER PATTERN**  
Faculty of Science  
Under Graduate (UG) Programme DAIRY SCIENCE - CURRICULUM  
(W.e.f. Academic year 2018 - 2019)  
An outline Class B. Sc. Third year

Core Course Code & Semester/ Annual Pattern	Section	Paper No. & Title	Periods per week	Marks for		Total Credits (Marks)
				External (ESE)	Internal CA	
DSEDS V and Semester V	Section A	Technology of Indigenous Dairy Products P.XII	3	Marks 40	Marks 10 Test/Seminar/ Assignment	Credits 02 Marks 50
	Section B (Elective)	* Forage Production, Feeds and Feeding P.XIII	3	Marks 40	Marks 10 Test/Seminar/ Assignment	Credits 02 Marks 50
DSEDS VI and Semester VI	Section A	Technology of Western Dairy Products P.XIV	3	Marks 40	Marks 10 Test/Seminar/ Assignment	Credits 02 Marks 50
	Section B (Elective)	* Sheep, Goat, Poultry and Pig Farming. P.XV	3	Marks 40	Marks 10 Test/Seminar/ Assignment	Credits 02 Marks 50
DSEDSP V and Annual Pattern	Section A	Laboratory Course Work V: Practical's based DSEDS - V (Sect. A&B) P.XVI	3	Marks 40	Marks 10 a) 05 for Record book b)05Marks for Viva-voce/Excursion report	Credits 02 Marks 50
	Section B	Skill Enhancement Course-III DSEDS -V : Practical based on Typical skill	3	25	25 CA	Credits 02 Marks 50
DSEDSP VI and Annual Pattern	Section A	Laboratory Course Work VI: Practical based DSEDS - VI (Sect. A&B) XVII	3	Marks 40	Marks 10 a) 05 for Record book b)05Marks for Viva-voce/Excursion report	Credits 02 Marks 50
	Section B	Skill Enhancement Course-IV DSEDS -VI :	3	25	25 CA	Credits 02 Marks 50

SEC Skill Enhancement Course >opt any one for each semester.

DSEDS = Discipline Specific Elective Dairy Science

DSEDSP = Discipline Specific Elective Dairy Science Practical ESE = End of Semester Examination

CA = Continuous Assessment

\* = Elective Paper

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**Choice Based Credit System (CBCS) And Semester Pattern**  
**DAIRY SCIENCE**  
**B.Sc. Third Year**  
**DSEDS-V Semester – V and DSEDS-VI – Semester- VI Theory and Practical**  
**SYLLABUS**

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The Silent Features of the Course:

1. Traditional milk products represent the most prolific segment of our Indian dairy industry.
2. Indian dairy products served as a cultural link with the modern dairy industry, provide a technological base for diversification, export promotion and as a value added product to make the modern dairy industry economically strong.
3. Consumption of western dairy products vary widely worldwide. western Dairy products provides have been an important part of human diet.
4. Economic livestock production achieved by feeding of least cost rations and balanced rations.
5. Goat rearing has been recommended as the best choice for the rural people in developing countries.
6. India Ranks first for goat genetic resources.
7. India's vast genetic resources in sheep reflected by the presence of number of breeds of sheep.
8. Sheep are reared for a verity of purposes and can be maintained under diverse environmental conditions.
9. Pig production is an enterprise of converting inedible or low quality food rich in animal protein.
10. Poultry keeping can be made a profitable business. Success or failure with poultry depends upon poultry keeper himself.

Utility of the Course:

After completing, one can work as a supervisor in a dairy plant either in equipment and plant design or project execution. He or She can also be a dairy consultant or take up entrepreneurial ventures in milk plants or ice cream, cheese, butter units. One can work as Dairy Farm manager.

Learning Objectives of the Course:

1. To impart training to develop confidence in the management practices in :a) Raising sheep, goat, poultry and pig. b) Care and management of different classes of livestock.
2. To inculcate capability for energy conservation through recycling of farm waste.
3. To inculcate knowledge of Production of hygienic milk, Manufacture of milk products indigenous and western Dairy products.
4. To inculcate Cultivation and preservation of fodder crops.
5. To develop facilities for production and sale of cattle feed, fodders.

6. To prepare young and enthusiastic entrepreneur for self-employment through dairying and dairy associated activities.

Prerequisites:

1. The knowledge of milk composition.
2. To know the body parts of live stock
3. To know the terminology used in dairying.
4. To know the different breeds
5. Basic knowledge of fodder parts.
6. Needs dairy equipments/instruments.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
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CHOICE BASED CREDIT SYSTEM (CBCS)  
**Semester Pattern Dairy Science B.Sc. Third Year**  
**DSEDS - V and Semester - V**

**SECTION – A**

**Title – Technology of Indigenous Dairy Products.**

**Marks – 50 / Credit 2 +0**                      **Paper -XII**                      **Total periods 45**  
**3 Periods per week**

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<b>Unit I</b>	<b>No. of Periods</b> <b>06</b>
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Introduction to milk product Technology.  
Indigenous dairy products and Entrepreneurial opportunities.  
Classification of milk products.  
Market milk product – scope and limitation.

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<b>Unit II</b>	<b>12</b>
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Study of starter culture  
Study of fermented milk products – curd, chakka,shrikhand  
Khoa – Definition, composition, types, manufacturing, packaging  
Khoa based sweetmeats- Pedha,Gulabjamun.

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<b>Unit III</b>	<b>12</b>
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Study of milk based products – Basundi and Rabri.  
Channa – Definition, composition,manufacturing.  
Channa Based sweet meats – Rasogolla, Sandesh,Kalakand.  
Panir-Definition, composition, manufacturing.

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<b>Unit IV</b>	<b>15</b>
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Makkhan – definition, composition, manufacturing, packaging  
Ghee – History, definition, composition, methods of preparation, grading, packaging,  
storage and defects, ghee residue.  
Indigenous frozen dairy products – kulfi, malaika-baraf.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
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**CHOICE BASED CREDIT SYSTEM (CBCS)  
B.Sc. Third Year Dairy Science DSEDS - V and Semester – V  
Section – B (Elective)  
Forge production, Feeds and Feeding**

**Max. Marks 50 /Credit 02+0**

**Paper-XIII**

**Total periods 45  
3 Periods per week**

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<b>UNIT– I</b>	<b>No. of periods</b>
	<b>10</b>

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- ❖ Classification of feeds.
- ❖ Importance of concentrates and roughages
- ❖ Feed additives, feed supplements.
- ❖ Antibiotics and Growth Promoters
- ❖ Probiotics in Animal Nutrition
- ❖ Hormones and Hormonal preparations

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<b>UNIT– II</b>	<b>13</b>
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- ❖ Cultivation of green forages, their nutritional characteristics and importance in Animal Nutrition.
- ❖ Cultivation of Legumes-Lucerne, Berseem, Subabhul.
- ❖ Cultivation of Non Legumes – Jowar, Maize, Bajra.
- ❖ Cultivation of Grasses-Napier, Para grass, Yeshwant, Jaywant.

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<b>UNIT–III</b>	<b>12</b>
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- ❖ Ration –Types, Principles of Rationing
- ❖ Feeding practices for different categories of animals – Dry, Pregnant, Lactating cow and buffalo.
- ❖ Processing of feeds and fodders – Physical, Chemical, Microbiological treatment.

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<b>UNIT– IV</b>	<b>10</b>
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- ❖ Significance of fodder preservation
  - Silage Making – Principles, Types of silo pits.
  - Ensiling, Bio-chemical changes during ensiling
  - Quality and characteristics of silage
  - Hay Making-Principles. Types, curing of hay, quality, characteristics of hay.
- ❖ Pasture management and grazing systems.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED  
CHOICE BASED CREDIT SYSTEM (CBCS)**

**Semester Pattern**

**B.Sc. Third Year Dairy Science**

**DSEDS - VI and Semester – VI**

**Section – A**

**Title: Technology of Western Dairy Products**

**Max. Marks 50/Credit 02+0**

**Paper-XIV**

**Total periods 45  
3 Periods per Week**

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<b>UNIT– I</b>	<b>No. of Periods</b>
	<b>09</b>
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Recent trends in Dairy Technology	
Membrane Technology	
Food Preservation	
Water activity	
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<b>UNIT– II</b>	<b>12</b>
<hr/>	
Cheese - History, definition, composition, classification, manufacturing defects and Storage.	
Condensed milk-History, definition, composition, manufacturing and defects.	
Evaporated milk-Definition, Composition, methods of manufacturing, Packaging, defects.	
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<b>UNIT–III</b>	<b>12</b>
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Cream-Methods of separation, types, defects, efficiency of cream separator.	
Ice-cream-History, definition, composition, manufacturing, storage, defects.	
Butter -Definition, Composition, Manufacturing, Storage and defects.	
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<b>UNIT– IV</b>	<b>12</b>
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Milk Powder - Definition, composition, types (SMP, WMP), methods of manufacturing, Packaging, Storage and defects.	
Study of special milks– Recombined milk, Reconstituted Milk, Yoghurts, Kefir and Kumiss. and milk products.	





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**CHOICE BASED CREDIT SYSTEM (CBCS)**

**B.Sc. Third Year, Dairy Science DSEDSP – IV – Annual Pattern  
Laboratory Course Work – IV – Section – A (Practical based on DSEDS – V  
Section – A & B)**

**Marks 50 / Credit 0+2**

**Paper-XVI**

**3 periods per week**

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- 1) Preparation of Curd,Lassi
  - 2) Preparation of Chakka,Shrikhand
  - 3) Preparation ofKulfi
  - 4) Preparation of Makkhan
  - 5) Preparation of Ghee
  - 6) Preparation of Channa, Rasogolla,Kalakand
  - 7) Preparation of Khoa, Burfi,Gulabjamun,
  - 8) Preparation of Basundi, Rabri
  - 9) Detection of adulterants in milk products.
  - 10) Silage making
  - 11) Haymaking
  - 12) Feed preparations and processing.
  - 13) Feed formulations
  - 14) Preparation of Cropping scheme
  - 15) Feeds and fodder collection.
  - 16) Visit to – feed factory, Dairy Industry,  
Traditional dairy product manufactures Agro industries  
BAIF Urlikanchan.
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**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**  
**Choice Based Credit System (CBCS)**  
**Semester Pattern**  
**DAIRY SCIENCE**  
**B.Sc. T.Y. SECDS-III**  
**Skill Enhancement Course Work III**  
**Section – B**

**Marks 50 / Credits– 2**

**Total Periods 45**  
**3 periods per Week**

**Skill Enhancement Course DSEDS – I (A)**  
**Dairy Byproducts**

<b>Unit I</b>	<b>No. of periods</b>
<p>Introduction, Definition, Classification of By products of Indian Dairy Industry            Composition of By products.            Various principles of utilization of food products</p>	<b>07</b>
<b>Unit II</b>	<b>10</b>
<p>Methods of utilization of skim milk- In the preparation of Industrial casein / Acid casein-            Introduction, Types, Flow diagram of manufacture composition, defects, uses</p>	
<b>Unit III</b>	<b>10</b>
<p>Methods of utilization of whey-            Whey beverages- Whey vit, yeast whey beverage.            Whey Protein Concentrates (WPC)            Lactose- Introduction, Principle, flow diagram of manufacture, Specification / standard, Uses.</p>	
<b>Unit IV</b>	<b>08</b>
<p>Methods of Utilization of Ghee residue-            Introduction, Definition, Composition, Utilization in the preparation of Candy, Chocolate etc</p>	
<b>Visits to –</b>	<b>10</b>
<p>Ghee manufacturing units, Beverage industry,.Lactose manufacturing units, Casein manufacturing units, Candy and chocolat es manufacturing units</p>	

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**Choice Based Credit System (CBCS)**  
**Semester Pattern**  
**DAIRY SCIENCE**  
**B.Sc. T.Y. SECDS-III**  
**Skill Enhancement Course Work III**  
**Section – B**

Marks 50 / Credits– 2

Total Periods 45  
3 periods per Week

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**OR**

**Skill Enhancement Course DSEDS – I (A)**  
**Concentrate Feeds and Agro industrial by products in animal Nutrition**

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<b>Unit I</b>	<b>No. of periods</b>
	<b>10</b>
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Study of Concentrates – Cereal Grains & Their Nutritive Value	
a) Oil Seeds, Oil Cakes & Nutritive Value	
b) Study of Concentrates available in local market.	
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<b>Unit II</b>	<b>05</b>
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<b>Concentrate by products –</b>	
Wheat bran, Rice bran, Maize Gluten Husk, Turchuni, Gram chuni	
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<b>Unit III</b>	<b>10</b>
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<b>Industrial by products –</b>	
a) Sugar Industrial by products – Molasses, Press-mud, Bagasse, Sugarcane tops, UMMB, UROMOL	
b) Animal Industrial by products – Fish meal, Bone meal, Blood meal, Poultry excreta & Local market available by products.	
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<b>Unit IV</b>	<b>10</b>
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<b>Fruit and Vegetable Industry by Products-</b>	
Seed Kernels, Hulls, Tomato Pomace, Potato Pomace, apple Pomace, Banana Peels, Citrus Peels, Pine apple waste, Leafy Vegetable Waste.	
<b>Visits /Excursions-</b> Field Study of Fodder Crops , Feed Factories, Oil Industries ,Fruit and Vegetable Industry to study by- products, Sugar Industry.	
	<b>10</b>

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
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**CHOICE BASED CREDIT SYSTEM (CBCS) B.Sc. Third Year Dairy Science DSEDSP –  
V and Annual Pattern Laboratory Course Work -V**  
**(Practicals Based DSEDS – VI Section A & B)**  
**Paper No. XVII**

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**Marks – 50 / Credit 0 +2**

**3 Periods per week**

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- 1) Determination of fat from milk products
- 2) Determination of TS milk products
- 3) Adulteration and its detection from dairy products
- 4) Preparation of Recombined milk, Reconstituted Milk
- 5) Preparation of Ice cream
- 6) Cream separation
- 7) Sundried milk powder
- 8) Study of sheep breeds
  - Indigenous breeds
    - Gaddi, Bhakarwal, Chokla,
    - Merwari, Deccani, Nellore,
  - Exotic breeds – Merino, Rambouillet
- 9) Study of Goat Breeds–
  - Indigenous – Jamunapari, Beetal, Surti, Osmanabadi, Sargamneri,
  - Exotic – Angora, Sannen,
- 10) Study of Poultry breeds- WLH, RIR
- 11) Study of Pig breeds- White Yorkshire, Deshi breeds
- 12) Poultry house equipments
- 13) Grading of wool
- 14) Grading of egg
- 15) Visits to – Sheep, Goat, Poultry and Pig farms,  
Agricultural and Veterinary colleges,  
Dairy Industries,  
Milk Powder Plants,

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CHOICE BASED CREDIT SYSTEM (CBCS)

**Semester Pattern**  
**DAIRY SCIENCE B.Sc. T.Y.SECDS IV**  
**Skill Enhancement Course Work IV**  
**Section – B**

**Marks 50 / Credits– 2**

**3 Periods per week**

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<b>OR</b> Skill Enhancement Course DSEDS – I (B) Special Milks	<b>Total Periods 45</b>
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<b>Unit I</b>	<b>No. of periods</b>
	<b>08</b>
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Introduction, Definition, Classification of Processed Special Milk	
(I) Processed Special Milk-	
i Sterilized Milk	
ii Homogenized Milk	
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<b>Unit II</b>	
	<b>07</b>
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Introduction, Definition, Methods of Manufacture, Uses of Value Added Special Milk	
(II) Value Added Special Milk -	
i Flavoured Milk	
ii Vitaminized milk / Irradiated Milk / Fortified Milk	
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<b>Unit III</b>	<b>10</b>
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Introduction, Definition, Methods of Manufacture, Uses of Fermented Special Milk	
(III) Fermented Special Milk	
i. Cultured Butter Milk	
ii. Acidophilus Milk	
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<b>Unit IV</b>	<b>10</b>
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(Introduction, Definition, Methods of Manufacture, Uses of Standardized Special Milk	
(IV) Standardized Special Milk- i. Toned Milk ii. Double Toned Milk	
(V) Special Milk of Plants / Vegetable origin- i. Soya Milk ii. Groundnut Milk	
iii. Almond Milk	
Visits to- Milk processing plants, Fermentation plants , Soya processing plants	
Food technology college	
	<b>10</b>

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CHOICE BASED CREDIT SYSTEM (CBCS)  
**Semester Pattern**  
**DAIRY SCIENCE B.Sc. T.Y.SECDS-IV**  
**Skill Enhancement Course Work IV**  
**Section – B**

Marks 50 / Credits– 2

3 Periods per week

	<b>Total Periods 45</b>
<b>OR</b>	
<b>Skill Enhancement Course DSEDS – I (A)</b>	
<b>Poultry Farming</b>	
<b>Unit I</b>	<b>No. of periods</b>
	<b>06</b>
Introduction to Poultry Framing History and Domestication of Poultry Framing Study of Poultry Breeds- White – Leg–Horn, RIR, Minorca, Kadaknath	
<b>Unit II</b>	<b>10</b>
Poultry Housing – Systems and equipment’s Egg: Structure, Grading, Marketing Hatchery Management	
<b>Unit III</b>	<b>09</b>
Brooding /Chick Management Grower Management Layers Management	
<b>Unit IV</b>	<b>10</b>
Poultry Diseases –Ranikhet, Gamboro,Marek’s, Coccidiosis, Ecto- Endo Parasites Vices in Poultry Visits- Poultry Farms, Vet. Hospitals, Hatcheries and Poultry feed factories	

### **List of Equipment / Glassware's**

- 1) Weighing scales, balances
- 2) Microscope, Colony counter, Inoculation chamber
- 3) Centrifugal cream separator (Hand operated, Power driven)
- 4) Butter churner and accessories, Mixer grinder
- 5) Heating units, heat exchangers
- 6) Stainless steel and iron pans, Ladle, spoons, scrapers
- 7) Paneer pot and paneer press
- 8) Cheese making equipments
- 9) Milk packaging materials, capping unit (handoperated)
- 10) Laboratory glasswares and required chemicals
- 11) Majoneer Flask
- 12) Centrifugal fat testing machine
- 13) Feed processing equipments
- 14) Silage making equipments
- 15) Equipments for preparation of unconventional feeds
- 16) Ice-cream making equipments.

## Reference Books:

- Outlines of Dairy Technology  
Milk and Milk Products  
Milk and Milk Products Technology
- Modern Dairy Product  
Dairy Chemistry  
Principals of Dairy Chemistry  
A Text book of Dairy Chemistry  
Fundamentals of Dairy Chemistry  
Dairy Chemistry  
Dairy Processing  
Indigenous milk products  
Hand book of Dairy Science  
Dictionary of Dairying  
Engineering for Food and Dairy Processing  
Dairy Plant-Management and Engineering  
Text book of Practical Dairy Chemistry  
Milk Testing  
Dairy Microbiology  
Dairy Bacteriology  
Fundamentals of Dairy Microbiology  
Standard Methods for Examination of Dairy Products  
Market Milk Industry  
Comprehensive Dairy Microbiology  
A Text Book of Animal Husbandry  
The Fluid Milk Industry-Henderson  
Technology of Dairy plant operations  
Technology of milk processing
- Milk and Its properties  
Chemical & Microbiological Analysis of  
Milk & Milk projects  
Goat production  
Dairy Cattle Science  
Animal Production and Dairy Technology  
Sheep, Goat and Poultry Farming  
Technology of Indian Milk Products
- S. K.De  
- Eckless, Combs and Macacy  
- Mohammad Raziuddin and Ashok Hembade.  
-Lampert  
- M.M.Rai  
- Jeneess & Patton  
- N.C.Ganguly  
- Web &Jonson  
-Fox  
- James Warner  
- ICARpub  
- K.C.Mahanta  
- Davis & Leonard Hill  
- E.M.Farrell  
- TufailAhemad  
- N.K. Roy & D.C.Sen  
- J.G.Davis  
- K.C.Mahanta  
-Hammer  
- J.B. Prajapati  
- GaryH. Richardson  
- C.I. Rhodhouse & J.L.Henderson  
- Yadav, Batish and Grover  
- G.C.Banerjee  
-ISI Specifications - BIS Publication  
- K.P.S.Sangwan  
- C.P. Anantakrishnan, A.Khan  
And P.N. Padmanabhan  
- S.M.Srivastava  
- Ramakant Sharma
- FAO  
- Ensminger  
- Satish Kulkarni  
-Satish Kulkarni  
-R.P. Aneja, B.N.Mathur R  
C Chandan, A.K. Banerjee.

Dr. A.S.Hembade  
**Chairman**  
(Board in Dairy Science)



**Swami RamanandTeerthMarathwada University, Nanded**

**B.Sc. Third Year**

**CBCS and Annual Pattern**

**Practical Question Paper Proforma**

**Laboratory Course**

**Time – 3.00 Hrs.**

**(Annual pattern) Paper-XVI**

**Marks - 40**

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Q.1 Spotting –10 spots (Milk Products / Appliances)/(Feeds and Fodders)	10
Q.2. Preparation of Dairy Product (anyone) Basundi / Rabri / Khoa / Channa/Silage making / Hay making	10
Q.3. Preparation of Dairy Product (anyone) Gulabjamun / Pedha / Rasogolla / Kalakand/Processing of feeds	08
Q.4. Preparation of Dairy Product Dahi / Chakka / Shrikhand / Makkhan /Ghee OR Cultivation Practices for Jowar/ Maize / Lucerne / Berseem	08
Q.5.Viva-voce	04

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**B.Sc. Third Year CBCS and Annual Pattern**  
**Practical Question Paper Proforma**  
**Laboratory Course - XVIII**

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**DSEDSP – V**  
**Paper-XVII**

<b>Time – 3.00 Hrs.</b>	<b>Marks - 40</b>
<b>Q.1.</b> Spotting –10 spots (Equipment's / Milk Products)/ (Sheep / Goat / Poultry / Pig breeds)	10
<b>Q.2.</b> Detection of Adulterants /Preparation of Ice-cream Estimation of TS / fat from milk products/Grading of Egg/ Shearing of wool	10
<b>Q.3.</b> Tonned / DoubleTonned milk/ cream separator / Poultry house equipments	08
<b>Q.4.</b> Preparation of Recombined milk/ Reconstituted Milk OR Grading of wool	08
<b>Q.5.</b> Viva-voce	04